AD NUMBER

ADB344307

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

Distribution: Further dissemination only as directed by US Army Corps of Engineers, Sacramento District, 1325 J Street, Room 1480, Sacramento, CA 95814, NOV 1998, or higher DoD authority.

AUTHORITY

COE/CA/SD ltr dtd 22 Oct 2008

DEFENSE TECHNICAL INFORMATION CENTER

Information for the Defense Community

DTIC® has determined on Month 11 Day 03 Year 2008 *that this Technical Document has the Distribution Statement checked below. The current distribution for this document can be found in the DTIC® Technical Report Database.*

☐ **DISTRIBUTION STATEMENT A.** Approved for public release; distribution is unlimited.

☐ **© COPYRIGHTED.** U.S. Government or Federal Rights License. All other rights and uses except those permitted by copyright law are reserved by the copyright owner.

☐ **DISTRIBUTION STATEMENT B.** Distribution authorized to U.S. Government agencies only. Other requests for this document shall be referred to controlling office.

☐ **DISTRIBUTION STATEMENT C.** Distribution authorized to U.S. Government Agencies and their contractors. Other requests for this document shall be referred to controlling office.

☐ **DISTRIBUTION STATEMENT D.** Distribution authorized to the Department of Defense and U.S. DoD contractors only. Other requests shall be referred to controlling office.

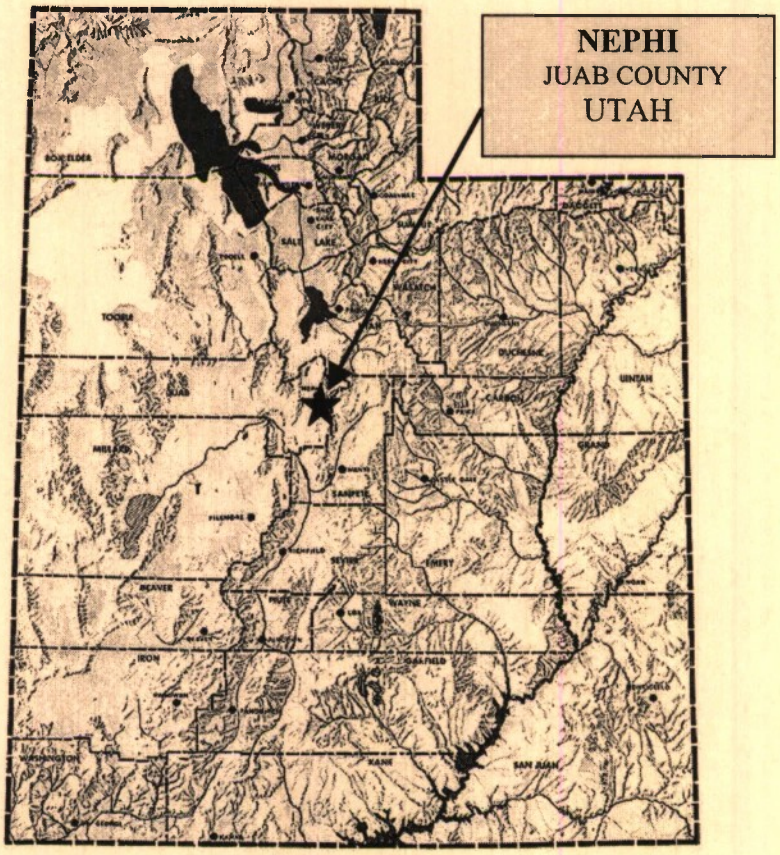
☐ **DISTRIBUTION STATEMENT E.** Distribution authorized to DoD Components only. Other requests shall be referred to controlling office.

☒ **DISTRIBUTION STATEMENT F.** Further dissemination only as directed by controlling office or higher DoD authority.

Distribution Statement F is also used when a document does not contain a distribution statement and no distribution statement can be determined.

☐ **DISTRIBUTION STATEMENT X.** Distribution authorized to U.S. Government Agencies and private individuals or enterprises eligible to obtain export-controlled technical data in accordance with DoDD 5230.25.

SPECIAL FLOOD HAZARD STUDY



PREPARED FOR
CITY OF NEPHI, JUAB COUNTY, UTAH

BY
U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
SACRAMENTO, CALIFORNIA

NOVEMBER 1998

SPECIAL FLOOD HAZARD STUDY

NEPHI, UTAH
NOVEMBER 1998

BACKGROUND

In January 1997, the State of Utah endorsed the request from the city of Nephi which requested that the Sacramento District Corps of Engineers study the flood hazards associated with Biglows and Miller Canyons to the southeast of the city of Nephi. The current Flood Insurance Rate Maps show only the flood plain for Salt Creek just east of Nephi. This study is intended to provide flood plain information resulting from a detailed hydraulic model of Biglows and Miller Canyons. This study was approved and funded under the Corps of Engineers Flood Plain Management Services program.

STUDY AREA

The city of Nephi, a community of approximately 1.5 square miles, is located at about 5,200 feet elevation on the northwest side of the San Pitch Mountains of central Utah, about 80 miles south of Salt Lake city in Juab County. The center of town is located on the alluvial fan formed by Salt Creek, which flows westward from the San Pitch Mountains. To the south of Salt Creek, Miller and Biglows Canyon Creeks discharge from steep canyons east of Nephi and pass through debris basins on alluvial fans, and flow west via small channels past Highway Interstate 15 (I-15) to West Creek. The Miller, Biglows and Fwy-15 Watersheds cover approximately 5.1 square miles of land on the west side of San Pitch Mountains. The study area lies to the southeast of the city of Nephi and extends from the canyon mouth to downstream of (I-15), a distance of about 5,000 feet on each creek. The study area is moderately developed rural farm lands.

TOPOGRAPHY

Topographic data was obtained from USGS 7.5-min Digital Elevation Models (DEMs). These DEM data are stored as profiles with 30-meter spacing along and between each profile. At the same time, USGS 7.5-minute quadrangles were used as background for drainage basin and flood plain boundaries. Culvert and channel information were obtained by measurements in the field by study personnel.

HYDROLOGY

The Sacramento District Hydrology Section developed an HEC-1 model to generate a 100-year cloudburst hydrograph above the debris basins of Bigelows and Miller Canyons. Flooding is generally a result of convective-type cloudburst storms. The 100-year precipitation was derived from the NOAA Atlas II for Utah. The unit hydrographs were computed using S-curve method. The loss rates were derived using the SCS Curve Number (CN) Method. Miller and Biglows runoff hydrographs were routed through the detention basins using the spillway rating data provided by the City of Nephi. The resulting 15 minute interval hydrograph produced a peak inflow to Miller Canyon Creek debris dam of about 422 cubic feet per second. The debris dam reduced this peak to a high flow of about 28 cfs for 6 hours duration. On Biglows Canyon Creek the peak inflow of about 744 cubic feet per second was reduced by Biglows Canyon debris dam to a high outflow of about 162 cfs. About 16 acre-feet of volume passes the emergency spillway during the 4 hours of highest flow. In addition, a smaller un-named basin designated Fwy-15 Basin was also modeled. *(For the detail analysis, refer to the **Flood Plain Management Study, Hydrology Report** for Nephi, Juab County, Utah).*

HYDRAULICS

The FLO-2D software package was used to delineate the flood plains. FLO-2D is a two dimensional, finite difference flood routing model which can simulate clear water, mud and debris flooding over unconfined alluvial fans and flood plains. It is a physical process based model which routes flood hydrographs and rainfall/runoff using a diffusive wave approximation to the momentum equation.

A FLO-2D model of the southern portion of the City of Nephi was developed from the DEM data. The model was developed by generating a gridded surface with a grid size of 200' from the DEM. The following features were then incorporated into the model: Freeway (I-15) modeled as a levee to prevent water from going over it; a channel down the hill from Biglows Canyon dam to direct the water to the culvert under I15; culverts under I15; and Area Reduction Factors (ARF's).

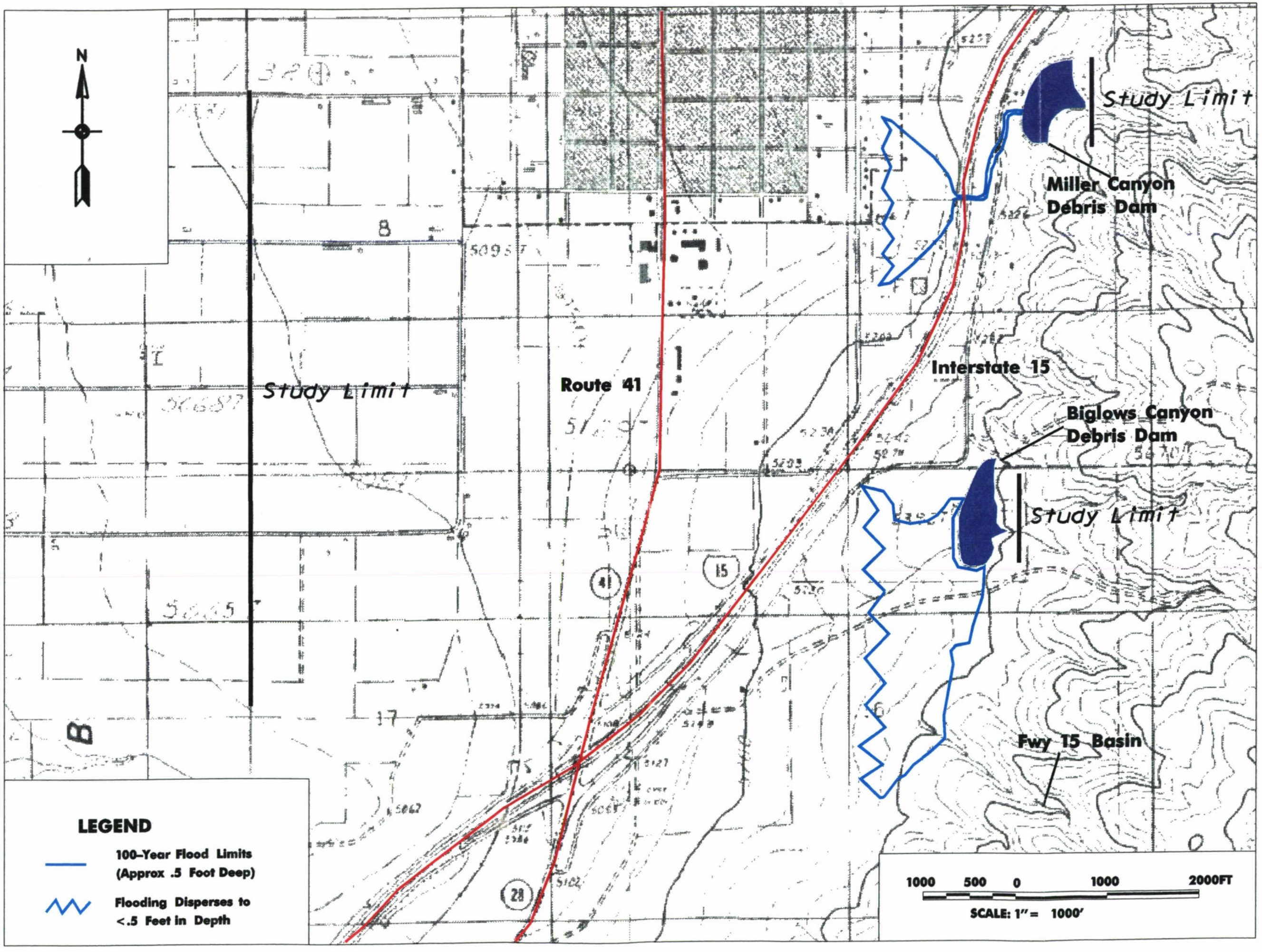
ARF's were applied through town at a value of 0.30. This reduces flow area by 30 percent to simulate reduced flow area due to buildings in the flood plain.

A Manning's roughness Coefficient of .08 was applied to the overland flow grid nodes, while a value of .035 was applied to the channel nodes. The model was run with clear water only, no debris loading, and infiltration was not applied because it had a negligible effect on the flood plain size.

Plate 1 shows the flood plains resulting from this study. The flow exiting Miller Canyon Dam stays in channel until passing under I-15. The flood flows then spread out in a shallow fan averaging one-half foot in depth and covering an area of about 1/4 square mile. Biglow Canyon Dam flood flow creates a shallow fan about 1 mile wide and ½ mile in length just below the Dam. This flood plain is augmented by the flow from the Fwy 15 Basin. The Fwy 15 Basin has no flood water retarding structure. Biglows Canyon and Fwy-15 Basin watersheds overlap and combine to a single flood plain. While this overland flow is shallow and averaging one-half foot, flooding less than one-half foot could occur downstream of the serated boundary.

CONCLUSIONS

Flood plain information resulting from the hydraulic modeling will provide the City of Nephi with flood plain information guidelines to better manage and regulate future development on the southeast part of the community. We recommend regulation of development in areas where floodwater depths are greater than 0.5 foot as delineated on **Plate 1.**



US Army Corps of Engineers Sacramento District

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

CIVIL DESIGN BRANCH
Hydraulic Design Section

Designed by: John Wiest
Drawn by: JCW
Checked by:
Reviewed by:
Submitted by:
Date: 29 June 1998
Design file ref:
SPEC. No.:
File name:
Plot date:
Plot scale:

UTAH
NEPHI

FLOOD PLAIN MANAGEMENT STUDY
100-YEAR FLOODPLAIN, MILLER CANYON
& BIGLOWS CANYON

Sheet reference number: 1
Sheet 1 of 1

TO: Defense Technical Information Center
ATTN: DTIC-O
8725 John J. Kingman Road, Suite 0944
Fort Belvoir VA 22060-6218

22 October 2008

FROM: US Army Corps of Engineers
Sacramento District Library
1325 J Street, Suite 820
Sacramento CA 95814-2292

SUBJECT: Submission of technical reports for inclusion in Technical Reports Database

The enclosed documents from USACE Sacramento District are hereby submitted for inclusion in DTIC's technical reports database. The following is a list of documents included in this shipment:

ADB344304 • Lemon Reservoir Florida River, Colorado. Report on reservoir regulation for flood control, July 1974

ADB344333 • Reconnaissance report Sacramento Metropolitan Area, California, February 1989

ADB344346 • New Hogan Dam and Lake, Calaveras River, California. Water Control Manual Appendix III to Master Water Control Manual San Joaquin River Basin, California, July 1983

ADB344307 • Special Flood Hazard Study Nephi, Utah, November 1998 (cataloged)

ADB344344 • Special Study on the Lower American River, California, Prepared for US Bureau of Reclamation – Mid Pacific Region and California Dept. of Water Resources..., March 1987

ADB344313 • Transcript of public meeting Caliente Creek stream group investigation, California, held by, the Kern County Water Agency in Lamont, California, 9 July 1979

ADB344302 • Initial appraisal Sacramento River Flood control project (Glenn-Colusa), California, 10 February 1989

ADB344485 • Report on November-December 1950 floods Sacramento-San Joaquin river basins, California and Truckee, Carson, and Walker rivers, California and Nevada, March 1951

ADB344268 • Reexamination Little Dell Lake, Utah, February 1984

ADB344197 • Special report fish and wildlife plan Sacramento River bank protection project, California, first phase, July 1979

ADB344264 • Programmatic environmental impact statement/environmental impact report Sacramento River flood control system evaluation, phases II-V, May 1992

ADB344201 • Hydrology office report Kern river, California, January 1979

ADB344198 • Kern River – California aqueduct intertie, Kern county, California, environmental statement, February 1974

ADB344213 • Sacramento river Chico Landing to Red Bluff, California, bank protection project, final environmental statement, January 1975

ADB344265 • Cottonwood Creek, California, Information brochure on selected project plan, June 1982

ADB344261 • Sacramento river flood control project Colusa Trough Drainage Canal, California, office report, March 1993

ADB344343 • Detailed project report on Kern River-California aqueduct intertie, Kern County, California. February 1974

ADB344267 • Sacramento River Flood Control Project, California, Right Bank Yolo Bypass and Left Bank Cache Slough near Junction Yolo Bypass and Cache Slough, Levee construction, General Design, Supplement No. 1 to Design Memorandum #13, May 1986

ADB344246 • Redbank and Fancher Creeks, California, General Design Memorandum #1, February 1986

ADB344260 • Cache Creek Basin, California, Feasibility report and environmental statement for water resources development Lake and Yolo counties, California, February 1979

ADB344199 • Sacramento River Deep Water Ship channel, California, Feasibility report and environmental impact statement for navigation and related purposes, July 1980

ADB344263 • Sacramento River flood control project, California, Mid-Valley area, phase III, Design Memorandum, Vol. I or II, June 1986

ADB344262 • Marysville Lake, Yuba River, California, General Design Memorandum Phase I, Plan Formulation, Preliminary Report, Appendixes A-N, Design Memorandum #3, March 1977

The **distribution statement is A** approved for public release; distribution is unlimited.

The Sacramento District source code is **410637**. Please return any materials that aren't appropriate for the technical reports database.

Please acknowledge receipt of shipment by sending email message to Frances.J.Sweeney@usace.army.mil.

Thank you,

Frances J. Sweeney
Library Manager
USACE, Sacramento District Library
916-557-6660